

Reversion from organic to conventional agriculture: A review

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Review Article

Abstract

Over the past 10 years, the organic sector has expanded continuously in Europe due to policy support and a growing market demand for organic products. In line with this development, many farmers converted to organic farming each year. Nevertheless, the total number of organic farms has not increased constantly in Europe. In several countries, the absolute number of organic farms actually decreased in some years of the past decade. Some of the deregistered farmers gave up completely; others reverted to conventional agriculture. Against this background, this article aims (i) to give an overview of the extent of reversion to conventional agriculture in Europe based on statistics, (ii) to conceptualize the decision to revert in the form of a theoretical model, (iii) to compare farmers' reasons to revert to conventional farming based on existing studies, and (iv) to identify further research needs. The importance of reversions to conventional agriculture is difficult to determine with the existing data, especially as in most cases it is not recorded as to what happened to the farms after deregistering from organic certification. The data nevertheless show that there are large fluctuations in the organic sector with many farmers entering and exiting each year. In order to reveal the farmers' reasons for deregistering, various qualitative as well as quantitative surveys have been carried out already. For most farmers, the decision to revert is a result of different factors. Reasons for the reversion of their farms can be classified into economic motives, difficulties regarding certification and control, problems with organic production techniques as well as the farms' macro environment. In most cases, however, economic reasons played a main role. Suggestions for organic legislation bodies, advisory services and policy makers are derived out of the findings. A deeper understanding of the influencing aspects regarding reversions and the necessary changes in the organic sector to avoid them should be an important objective of forthcoming research.

Key words: reversion, conversion, dropping out, organic agriculture

Introduction

Over the past 10 years, the organic sector has expanded continuously in Europe due to policy support and a growing market demand for organic products¹. Many farmers convert to organic farming each year, in line with this development. Nevertheless, the total number of organic farms has not increased constantly in Europe. In several countries, the number of organic farms decreased in some years of the past decade. This holds true for Austria (1999–2001, 2006, 2007), Denmark (2003–2006, 2008, 2009), Finland (2001, 2003–2006, 2008),

Netherlands (2003–2006), Switzerland (2006–2009) and the United Kingdom (2003, 2005, 2008, 2009)².

However, these data provide no information about how many organic farmers gave up completely and how many farmers reverted to conventional agriculture (in this article, the term reversion stands for farms which were once certified organic but deregistered from organic certification and control in order to continue farming conventionally). Besides, the figures representing the total number of organic producers per year include dropouts and newcomers simultaneously. Therefore, high fluctuations caused by a large number of farmers

Table 1 Share of deregistered producers and net change from 2000 to 2010 in European countries.

Country	Share of deregistered producers as percentage of organic producers per country and year											Net change between 2000 and 2010	
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Number of farms	%
Greece	25.2	n.d.	60.0	10.9	12.4	9.4	9.4	9.9	4.0	8.1	17.2	+15,931	+298.2
Spain	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	4.5	n.d.	7.3	7.9	n.d.	+14,483	+108.1
France	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	3.3	+11,619	+129.3
Germany	3.1	3.8	5.0	5.8	7.0	5.0	3.9	3.5	3.5	3.3	4.2	+9,202	+72.2
Austria	5.4	n.d.	n.d.	n.d.	1.8	1.5	n.d.	n.d.	n.d.	n.d.	n.d.	+1,973*	+10.4*
Sweden	9.3	4.1	11.1	7.9	6.6	19.1	4.8	n.d.	n.d.	n.d.	5.4	+1,582	+43.6
UK	n.d.	n.d.	n.d.	n.d.	n.d.	10.8	14.1	7.2	15.0	9.1	8.7	+1,386	+38.9
Norway	6.5	6.5	8.6	8.5	7.9	6.1	6.3	6.1	6.9	5.7	6.8	+965	+52.4
Switzerland	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	+757	+15.4
Ireland	n.d.	n.d.	n.d.	n.d.	5.6	2.3	3.8	1.8	3.6	6.5	n.d.	+476*	+55.9*
Belgium	7.1	10.5	11.2	15.4	8.2	2.6	6.7	6.3	8.7	6.5	n.d.	+373*	+59.8*
Netherlands	n.d.	n.d.	n.d.	n.d.	8.5	4.1	2.2	n.d.	n.d.	5.3	2.9	+333	+29.5
Luxembourg	6.5	2.0	1.9	3.4	0.0	6.8	n.d.	n.d.	n.d.	n.d.	n.d.	+46*	+148.4*
Denmark	2.4	6.2	1.4	7.6	13.6	7.9	12.3	n.d.	7.1	6.2	4.5	-789	-22.8
Finland	7.2	8.4	2.9	5.5	n.d.	13.9	11.6	4.3	4.6	2.7	5.0	-1,203	-23.0
Italy	3.9	8.4	9.9	28.9	34.4	7.7	7.9	7.9	11.2	14.4	19.1	-10,989	-20.8
Bulgaria	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	0.0	18.8	39.0	4.3	4.1	n.d.	n.d.
Czech Rep.	n.d.	n.d.	n.d.	n.d.	1.3	6.6	3.6	3.0	3.4	5.1	5.2	n.d.	n.d.
Estonia	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	2.9	4.8	3.6	12.1	6.1	n.d.	n.d.
Latvia	n.d.	n.d.	n.d.	n.d.	4.4	0.4	1.1	1.2	1.9	5.8	17.9	n.d.	n.d.
Lithuania	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	10.9	n.d.	n.d.	n.d.
Hungary	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	13.3	n.d.	n.d.
Malta	n.d.	n.d.	n.d.	n.d.	0.0	0.0	0.0	n.d.	n.d.	29.4	18.2	n.d.	n.d.
Portugal	8.9	6.6	8.6	0.0	0.0	0.0	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Slovenia	n.d.	n.d.	n.d.	n.d.	3.4	12.5	3.2	n.d.	2.5	6.9	5.5	n.d.	n.d.
Slovakia	n.d.	n.d.	n.d.	11.4	11.1	15.9	8.7	3.9	9.2	11.0	n.d.	n.d.	n.d.
Cyprus	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Poland	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Romania	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

n.d. = no data.

* = net change calculated between 2000 and 2009 as data for 2010 were not yet available.

Source: Own compilation following².

leaving organic certification while at the same time many others newly registering for it are not necessarily conspicuous as long as the overall number is still increasing.

Against this background, this article aims (i) to give an overview of the extent of reversion to conventional agriculture in Europe based on statistics, (ii) to conceptualize the decision to revert in the form of a theoretical model, (iii) to compare farmers' reasons to revert to conventional farming based on existing studies, and (iv) to identify further research needs.

In the following sections first an overview of the extent of reversion in Europe and the USA is given based on official statistics as well as on results of studies. Subsequently, the theoretical model is described, which is applied in order to understand the reversion decision. This is followed by a review of the research results about the reasons for reversion. Finally, some conclusions for further research are drawn.

Dimensions of Reversion

Official statistics on reversion

The statistical data are supplied by the European statistical database Eurostat, which gives an overview about the entrants and dropouts in organic farming. For some countries, however, only the total number of organic farms per year is available without the respective share of newly converted farms and the number of those who reverted. For some other countries, the data are completely missing. In addition, it has to be noted that the statistics regarding deregistration only give a total figure of all the deregistered farms and do not differentiate between the reversions to conventional agriculture and farmers giving up farming altogether. Due to the amount of missing data, it is difficult to report the overall trends across countries over time. Nevertheless, some interesting developments can be observed as shown in [Table 1](#).

Table 2 Deregistered farms and total number of farms.

Country	Deregistered farms	Measured period	Total number of organic farms (year)
Austria ⁷	3419 deregistered	2000–2002	20316 (1998)
Denmark ⁸	266 deregistered	2003	3500 (2003)
Ireland ⁹	> 200 deregistered	2003–2006	n.d.
Norway ¹⁰	523 deregistered	2004–2007	1913 (2006)
Switzerland ¹¹	281 reverted +233 stopped farming	2005–2007	6349 (2005)
United Kingdom ¹²	204 deregistered from Soil Association	1993–1999	n.d.
USA (California) ¹³	1334 deregistered	1992–1996	1469 (1996)
USA (California) ¹⁴	358 deregistered	2002	1847 (2002)

n.d. = no data.

Source: own compilation.

In Greece, there were several years with an extremely high percentage of reversions, especially 2002, where 60% of all organic farmers reverted. Not surprisingly, the total number of Greek organic farms actually decreased in 2002, as well as in 2007, 2008 and 2010. Looking at the whole period between 2000 and 2010, however, reversions were more than compensated for by a large number of new conversions to organic farming. The overall number of organic farms in Greece has therefore increased by almost 16,000 farms during this time, which represents a growth of nearly 300%. A large net increase of over 10,000 organic farms, which represents a growth of more than 100% between 2000 and 2010, also happened in Spain and France. For these countries, however, there are hardly any data available regarding reversions or new conversions in the intermediate years.

Germany and Norway had steady dropout rates, always remaining under 10% of all organic farms per year. Over the 10-year period, both countries had a net increase in the number of organic farms, which lay above 50% in Norway and above 70% in Germany. In Belgium, dropout rates varied considerably between 15% in 2003 and 3% in 2005. Nevertheless, the overall number of organic farms increased over the period between 2000 and 2009 by almost 60%.

In Denmark, Finland and Italy the total number of organic farms decreased since 2000. The largest net decrease happened in Italy with almost 11,000 fewer organic farms in 2010 than in 2000, which represents a decrease of about 20%. In Italy, the largest deregistration rates appeared in 2003 and 2004. Similarly decreases of more than 20% over the 10-year period can be observed in Finland and Denmark, although the overall number of organic farms is much lower in these countries.

Evidence of reversion from the literature

The dimensions of reversion in the respective countries were determined in the examined studies either by asking

current organic farmers about their intentions regarding the prolongation of organic farming, by surveying ex-organic farmers or by analyzing national statistical data about deregistered producers.

When asked about their intentions concerning the continuance of organic farming or planned reversion to conventional agriculture, there were very similar results in different European countries and in different years. In an early study in Germany in the 1990s, 14% of the interviewed organic farmers were determined to revert after the expiration of the first organic program, whereas 36% were undecided³. Ten years later in a Danish study, 13% considered reversion within the following 5 years⁴.

An interesting course of studies was conducted in Austria: In a survey in 1999, 13% of the interviewed organic farmers were determined to revert and 23% were undecided⁵. Of those farmers who participated in the follow-up survey 3 years later, 13% had actually reverted. The reverted farmers were mostly those who had indicated earlier that they planned to revert, but also some who had originally been undecided or intended to stay organic⁶.

More accurate indicators of reversion are therefore figures of farms which already reverted to conventional agriculture. The reviewed literature^{7–14} gives various figures regarding the number of deregistered farms in the respective countries (see Table 2). However, in most cases the statistics only describe the deregistered producers in general and do not differentiate between the reverted farmers, namely those who once farmed organically and are now farming conventionally, and those farmers who once farmed organically and gave up farming completely. The termination of the whole farming enterprise is a general problem of agriculture in the context of overall structural change, which is not the focus of this article. A comparison between different countries is furthermore difficult due to a very heterogeneous reference framework, as some authors report deregistered producers per country and year, others over a period of several years or only those deregistered from one certification body.

Table 3 Motivations to convert to organic production.

Farming related motives	Personal motives
Husbandry and technical reasons <ul style="list-style-type: none"> • Animal health problems • Soil fertility and erosion problems 	Personal health <ul style="list-style-type: none"> • Own and family health problems • Ergonomic reasons
Financial motives <ul style="list-style-type: none"> • Solve existing financial problems • Secure future of the farm • Cost saving • Premium marketing 	General concerns <ul style="list-style-type: none"> • Food quality • Nature conservation and environment • Rural development

Source: ¹⁶.

Framework

In order to conceptualize the decision to revert a farm, a theoretical model based on decision theory is developed. Decisions can be understood as a choice between different options, which aim to achieve certain goals. According to Mintzberg *et al.* ¹⁵, the process of decision-making consists of the following activities which are not necessarily made in a sequential order: (i) identification of problems and opportunities, (ii) definition and clarification of options, and (iii) evaluation and choice between alternatives. Putting this into the context of reversion, the decision to return to conventional farming is the choice of an alternative to organic farming. It is therefore a correction of a previous decision (to convert the farm) based on an ex-post evaluation of the conversion decision and an ex-ante evaluation of maintaining the organic status. (This refers to the situation in which a farmer first converts and later reverts the farm. Cases in which a reversion is due to new farm management are not taken into account.) A reversion occurs if the ex-post/ex-ante evaluation leads to a negative judgment of the organic status and/or if the net utility of conventional management is expected to be higher in the future. Following these thoughts, reasons for the decision to revert can be divided into (i) unmet expectations, (ii) promising alternatives, and (iii) the judgment of transaction costs.

Key elements of post-evaluation are expectations connected to the conversion. From the literature it is known that farmers convert to organic farming for various reasons. Padel ¹⁶, for example, divides the reasons for conversion to organic farming into farming related and personal motives (Table 3). The farming related motives consist of animal husbandry, technical reasons and/or financial motives. Personal health and general concerns such as the state of the environment or food quality are personal motives for conversion.

The relative importance of the different motives varies. In a Canadian study it was found that 'health and safety concern and environmental issues are the predominant motives for conversion, while economic motives are of

lesser importance' ¹⁷. Several other studies also emphasize that social ¹⁸, health, or environmental reasons ^{17,19,20} play a significant role. Nevertheless, in other studies it was found that subsidies ^{21–24} and supposedly higher profits ^{21,25} are the driving factors for converting to organic farming. Since conversion-related motives are connected to specific expectations, reversion to conventional farming methods can be explained by unmet expectations and a perceived lower utility of the organic system than expected. In this context, utility can be defined as the sum of economic benefits and the value to act according to one's personal beliefs ²⁶. In algebraic terms, the relationship between expected and effective utility of organic farming can be formulated as follows, with $E(U_{\text{org}})_{t_0}$ as expected utility before the conversion and $(U_{\text{org}})_{t_1}$ as effective utility after the conversion:

$$E(U_{\text{org}})_{t_0} > (U_{\text{org}})_{t_1}$$

A simple example is the expected profit under organic management. If the farmers are not able to obtain premium prices and yields decrease substantially, the profits can be lower under organic management than initially expected. In this case, the expectation that a conversion to organic farming would solve financial problems is not fulfilled.

Unmet expectations do, however, not necessarily lead to reversion. For this, it is also relevant that the conventional system represents a realistic alternative. It is important to bear in mind that the net utility of either organic or conventional farming is not static over time. Changing framework conditions can decrease the utility of the organic system (e.g. due to new organic regulations which are difficult to implement) and/or increase the utility of conventional management (e.g. due to rising conventional prices). Another element of the decision to revert is therefore based on an ex-ante evaluation of alternative (non-organic) management strategies and the expectation that they will lead to a higher utility. A reversion becomes likely if the expected utility of future conventional farming $E(U_{\text{con}})_{t_2}$ is higher than the expected utility of maintaining the organic status in the future $E(U_{\text{con}})_{t_2}$. In algebraic terms, this can be formulated as

$$E(U_{\text{con}})_{t_2} > E(U_{\text{org}})_{t_2}$$

A third element is related to transaction costs. Reversion to conventional farming could, for example, mean that specific machinery used for organic management techniques has no or only little use under conventional management. In fact, all conversion-related investments can be counted as transaction costs. Besides, if an organic farm receives organic support payments under agri-environmental programs of the EU, a reversion before the end of the 5-year contract period implies that the farmer has to reimburse the payments received under the current

management contract. High transaction costs are therefore an important barrier for reversion in EU countries.

Thus, the utility of reversion U_{rev} can be divided into three elements: (i) the difference between expected and effective utility of the organic system with respect to economic performance, animal husbandry and technical problems, personal health, nature conservation and environment, food quality and other aspects; (ii) the difference between the expected utility of conventional and organic farming in the future; and (iii) the transaction costs of reversion TC_{rev} .

$$U_{rev} = E(U_{org})_{t_0} - (U_{org})_{t_1} + E(U_{con})_{t_2} - E(U_{org})_{t_2} - TC_{rev}.$$

From a theoretical point of view, a reversion would be useful for a farmer if the utility U_{rev} has a positive value.

Empirical Evidence on Farmers' Reasons for Reversion

Approach

In order to reveal farmers' reasons for reverting to conventional farming methods, a thorough literature research was conducted in scientific journals, databases, library catalogues, gray literature, project reports and online publications. In total, 12 relevant studies were identified from six EU-countries (Austria, Denmark, Estonia, Ireland, Italy and the United Kingdom) and two non-EU-countries (Norway and Switzerland). Additionally, three studies dealing with reversion of organic farms in the USA were found. Since the organic certification and support policies in the USA differ substantially from the situation in Europe, the reasons for reversion in the USA are discussed here only marginally. An overview of the studies is given in Table 4^{3-14, 27-49}.

Reasons for reverting from organic to conventional farming

Researchers facing the phenomenon of reversion used different approaches by surveying farmers and consultants or analyzing organic registration data. The most commonly used survey method to identify reasons for reversion was a written or telephone survey with all or a sample of farmers who deregistered during a certain period, asking about their reasons in retrospect, e.g. in Austria^{7,29-31}, Estonia³⁴, the United Kingdom^{12,46} and the USA¹⁴. In Ireland⁹ and Norway^{10,36,40,41}, researchers surveyed organic and deregistered farmers simultaneously, in Switzerland additionally conventional farmers^{11,42-45}. Kirner et al. (Austria^{6,28}), Kaltoft and Risgaard (Denmark⁸), Koesling et al. (Norway^{37,38}), Harris et al. (United Kingdom⁴⁷) and Sierra et al. (USA^{14,49}) used a qualitative survey with farmers and/or agricultural consultants to accompany quantitative results. In Germany³, Austria^{5,27} and Norway¹⁰, organic farmers were asked whether they intended to continue

organic farming during the next 5–10 years or after the current organic program ended. In Austria^{6,28}, this study was complemented by a follow-up survey to determine the actual farming status some years later. Harris et al. (United Kingdom⁴⁷) and Klonsky and Smith (USA¹³) on the other hand analyzed registration records in order to find determinants for reversion in the structural data of farms. Koesling and Løes⁵⁰ already presented a comparison of reasons for reversion in Austria, Denmark, Estonia, and Norway.

Analyzing the literature, the farmers' reasons for the reversion of their farms can be roughly classified into economic motives, difficulties regarding certification and control, and problems with production techniques and the macro environment of the organic farm (see Table 4). For most farmers, however, the decision to revert is a result of different factors, including various additional individual or personal ones.

Economic reasons. Nearly all studies point out that economic problems are the main reason for most organic farmers to revert. Agricultural consultants in Denmark explained that only a few organic farmers would consider reversion at all if the overall economic basis was better⁸. Harris et al. (United Kingdom⁴⁷) and Läpple (Ireland⁹) also found that some farmers apparently reverted only due to economic necessities.

According to Schneeberger et al.²⁷, the difference between organic subsidies and payments through other environmental programs in Austria was too small. Ferjani et al.⁴⁴ also reported that organic subsidies and direct payments were too low and uncertain in Switzerland. In a German study, Hamm et al.³ found that one-third of the surveyed 118 farmers had converted mainly due to attractive organic subsidies in a certain extensification program. Consequentially, when asked about the continuance of organic agriculture under another program with reduced subsidies, only 50% were determined to continue, whereas the other half was either undecided or determined to resign from certification. In Denmark, some farmers stated that they only converted to organic in order to use organic subsidies for the further development of their farms (e.g., build new stables). They had never planned to continue with organic farming beyond the first 5-year period⁸.

Several authors suggested that producer prices for organic products were generally not sufficient to compensate increased production costs (e.g. in Austria^{6,7}, Switzerland⁴⁵ and Norway^{10,37}). When asked in detail, farmers complained about insignificant organic price premiums compared to conventional products, whereas the additional time and effort as well as prices for purchased fodder or seeds were too high (Austria^{7,27}). They also mentioned difficulties to obtain organic fodder and seeds. Ploomi et al. (Estonia³⁴) reported that some farmers reverted because they experienced a higher workload for organic methods and simply did not have enough workforce.

Table 4 Studies about deregistered organic farmers.

Country	Year of survey	Data collection method and sampling	Analyzed sample regarding reasons for reversion	Analysis methods	Reasons for reversion
Austria I ^{5,6,27,28}	1999, 2002, and 2004	(a) Out of a total of 18,960 organic farmers in Austria, random selection of 1500 for a written survey in 1999 (600 responses). Selection of farmers intending to commit to a further 5-year period of organic farming once the first program ended (388 continue organic, 76 end participation, and 136 undecided). Out of those intending to end participation and those undecided, 48 gave contact details (b) Written survey with those 48 farmers in 2002 (38 responses). Out of these, 13 actually reverted (c) Telephone interviews in 2004 with these 13 farmers and with five farmers who had intended reversion but continued organic farming	(a) 600 farmers (587 indicated year of conversion)→212 farmers intending reversion or undecided (b) 38 farmers intending reversion or undecided (c) 13 reverted farmers and five organic farmers	Descriptive analyses Factor analysis	<ul style="list-style-type: none"> ● Low price difference between organic and conventional products ● Bureaucracy ● High production costs ● Changes in standards ● Low difference in subsidies compared with other programs ● Frequent and strict controls ● Animal feeding (limitations and costs)
Austria II ^{29,30}	2000	Written survey with all 745 reverted farmers in Tirol (334 responses) Further analyses of Austria I with regard to Tirol (83 farmers in Tirol)	334 reverted farmers	Descriptive analyses	<ul style="list-style-type: none"> ● Low subsidies ● Low price difference between organic and conventional products ● Marketing problems ● Strict controls ● Dislike of control
Austria III ^{7,31}	2003	Out of a total of 3419 farmers who deregistered between 1999 and 2002, random selection of 1200 for a written survey in 2003 (472 responses)	326 reverted farmers	Descriptive analyses Factor analysis	<ul style="list-style-type: none"> ● High prices for fodder ● Low price difference between organic and conventional products ● Changes in standards ● Dislike of control ● Bureaucracy ● Lacking infrastructure for marketing
Denmark ^{4,8,32,33}	2002 and 2003	(a) Interviews with ca. 10% of all organic farmers in 11 study areas in Denmark (b) Two qualitative studies containing personal interviews with agricultural consultants and farmers who reverted or considered reversion (identified in (a))	(a) 347 organic farmers (b) Both qualitative studies together: eight consultants, 11 farmers (reverted or considering reversion)	Descriptive analyses Qualitative analyses	<ul style="list-style-type: none"> ● Financial reasons ● Marketing problems ● Letting of land is more profitable ● Land scarcity ● 5-year commitment ● Changes in standards ● Bureaucracy ● Weeds

Estonia ³⁴	2005	Telephone interviews with 92 farmers who reverted	64 reverted farmers	Descriptive analyses	<ul style="list-style-type: none"> • Financial reasons • Bureaucracy • Weeds and phytosanitary problems • Regulations regarding animal husbandry • Marketing problems • Lowered subsidies
Germany ³	1996	Written survey with all 445 organic farmers in Mecklenburg-Western Pomerania (137 responses)	118 organic farmers	Descriptive analyses	
Ireland ⁹	2008	<p>(a) Written survey with all organic and reverted farmers in 2008</p> <p>(b) Data on conventional farmers collected through 'Teagasc National Farm Survey' Restriction of analysis to drystock farms</p>	<p>(a) 341 organic farmers, 41 reverted farmers</p> <p>(b) 164 conventional farmers</p>	Factor analysis Duration analysis (period 1981–2008)	<ul style="list-style-type: none"> • Higher probability to revert if farmer has off-farm job • Higher probability to revert after 5 years than before
Italy ³⁵	1993–2006	Analysis of the database of a certification body (IMC) in the Marche Region	966 organic farmers	Bayesian Network	<ul style="list-style-type: none"> • Influencing factors on reversion are age, province, and farm size
Norway ^{10,36–41}	2007	<p>(a) Analysis of structural data</p> <p>(b) Personal interviews with reverted farmers and agricultural consultants</p> <p>(c) Written survey in 2007 with all 523 farmers who had deregistered between 2004 and 2007 and with</p> <p>(d) 621 organic farmers (random sample of all 1913 organic farmers) → Question on expected farming status in 5–10 years</p>	<p>(a) Seven farmers, five consultants</p> <p>(b) 220 deregistered farmers (170 reverted, 36 stopped farming, 14 mistakenly deregistered or converted again), 407 still organic farmers</p> <p>(c) 277 farmers intending to revert or to stop farming</p>	Qualitative analyses Descriptive analyses Factor analysis	<ul style="list-style-type: none"> • Changes in standards • Bureaucracy • Low subsidies • Low organic price premiums • Animal husbandry

Table 4 (Cont.)

Country	Year of survey	Data collection method and sampling	Analyzed sample regarding reasons for reversion	Analysis methods	Reasons for reversion
Switzerland ^{11,42-45}	2009	(a) Analysis of structural data of organic farmers from the 'Bundesamt für Landwirtschaft' (AGIS) (b) Written survey with 3425 farmers (991 long time organic farmers (at least since 2005), 281 farmers that deregistered 2006/07, 153 new converters in 2006/07, 2000 long time conventional farmers) (c) Written survey with ca. 400 agricultural students	(a) 1177 farmers (580 conventional farmers, 450 long time organic farmers, 60 new organic farmers, 87 deregistered farmers). (b) 256 agricultural students	Descriptive analyses Factor analysis Logistic regression	<ul style="list-style-type: none"> • Changes in standards • Strict standards • Low organic price premiums • High production costs • High prices for fodder • Low subsidies • Control costs • Access to organic litter and fodder
UK I ^{12,46}	1996 and 2000(?)	(a) Dataset collected in 1996 from 86 organic farmers (b) Telephone interviews (and some written questionnaires) in 2000(?) with all 204 farmers who deregistered from 'Soil Association' since 1993	(a) 86 organic farmers (b) 35 deregistered farmers	Qualitative and quantitative analyses Logit model	<ul style="list-style-type: none"> • Marketing problems • Financial reasons • Production problems
UK II ⁴⁷	2004	(a) Data about the number of farmers who deregistered between 2000 and 2003 from the two largest certification bodies in the United Kingdom ('Soil Association' and 'Organic Farmers and Growers') who jointly certify about 80% of all organic farmers (b) Details about 321 deregistered farmers from one of the certification bodies (c) Personal semi-structured interviews with farmers who deregistered between 2000 and 2003	(a) Detailed data about 176 reverted farmers (b) Personal interviews with 22 reverted farmers	Descriptive analyses	<ul style="list-style-type: none"> • Lacking demand • Low producer prices • Negative experience with certification and control • Production problems
USA I ¹³	?	Analysis of annual registration forms for organic farmers in California from 1992 to 1997	796–1198 registrants per year	Random utility model	<ul style="list-style-type: none"> • Higher probability for specialized farms to deregister

USA II ⁴⁸	2003	Telephone interviews with experts and with conventional and mixed (conventional and organic) farmers and with farmers who had reverted until 2002 in California	30 experts 30 conventional farmers 20 farmers with mixed cultivation 20 reverted farmers	Descriptive analyses	<ul style="list-style-type: none"> • High production costs • Low yields • Poor quality • High labor costs • Weeds • Marketing problems • Small quantities
USA III ^{14,49}	2007	(a) Semi-structured telephone interviews with farmers who deregistered between 2003 and 2005 in California (b) Mail survey with 501 farmers who had deregistered between 2003 and 2005 (107 responses)	(a) 21 farmers (b) 77 deregistered farmers	Descriptive analysis Cross tabulation	<ul style="list-style-type: none"> • Regulatory issues • Issues unrelated to organic production • Production issues • Market issues • Management issues • Price issues

Deregistered: farmers who quit organic farming but it is unknown whether they quit farming altogether or continued with conventional farming.
 Reverted: farmers who quit organic farming and continued with conventional farming.

Flaten et al. (Denmark¹⁰) found that specialized farms generally had more economic problems and a higher likelihood to revert than diversified farms. Risgaard et al. (Denmark³³) explained that marketing of organic products was much more challenging than that of conventional products and therefore an organic farmer needed to be interested not only in producing but also in marketing his products.

Certification and standards. Difficulties with certification, control and organic standards are also the major reasons for reversion. Obviously, regulations as well as certification and control processes vary between different systems, even within the EU. Nevertheless, many similarities were found regarding farmers' perception of certification, standards and control. In Austria, for example, these problems were the second most important reason after economic aspects²⁷. The economic aspect of certification and control, namely the certification and control costs, were also very important in some cases (United Kingdom⁴⁷ and Switzerland⁴⁴). The burden of fixed control and certification costs can be a problem especially for small farms (Austria³¹ and United Kingdom⁴⁶).

Many farmers complained about a huge amount of bureaucracy when asked about the certification and control process (Austria²⁷, Denmark⁸, Estonia³⁴ and Norway^{10,40}). According to Darnhofer et al. (Austria⁷), farmers also perceive the everyday documentation of procedures as too complex. Besides, farmers criticized frequent changes in organic regulations and necessary adaptations they have to make to conform to regulations (Austria⁷, Norway¹⁰ and Switzerland⁴⁴). The frequent changes resulted in insecurity and frustration (Austria^{27,31} and Denmark⁸), especially when farmers perceived the alterations to be scientifically unjustified (Norway³⁷). In addition to the overall unpredictable political framework, organic farmers felt that the security of their future income was at risk. Changing regulations can cause enormous difficulties, in particular for organic farms with animal husbandry, especially in cases when the modification of stables necessitates high and long-term investments (Austria³¹, Estonia³⁴ and Norway³⁷).

Many farmers complained about very strict or highly complicated regulations that are hard to fulfill (Austria²⁷, Norway¹⁰, Switzerland⁴⁴ and United Kingdom⁴⁷). Others generally did not like their farms to be inspected (Austria^{7,31}). One of the main reasons for farmers to revert in the United Kingdom was negative experience with the certification and control process⁴⁷. In Denmark, farmers said that dissatisfaction with control procedures was not generally a reason for reversion, it was only in those cases when the inspector was too strict³².

Furthermore, for many farmers the commitment to the certification period of 5 years (as stated by organic EU-Regulations in order to receive organic subsidies) was too long, and farmers wanted more flexibility. Some stated that the first 5-year period was acceptable, but the

commitment to the next 5 years was too much (Austria³¹ and Denmark⁸). Generally, there is a higher likelihood to revert after the first 5-year period than during the first 5 years, otherwise farmers would have to reimburse the subsidies received (Ireland⁹).

Production techniques. Problems regarding organic production techniques were mentioned frequently in the analyzed studies, but interestingly, they only played a minor role in most cases (e.g., Austria^{27,31}). A Danish publication even stated that problems regarding production techniques cannot be viewed as an important reason for reversion³³. Nevertheless, several authors pointed out some problems with organic plant production and animal husbandry that led to reversions. Rigby *et al.* (United Kingdom⁴⁶), for example, mentioned problems with production techniques especially with access to technical information. Ploomi *et al.* (Estonia³⁴) stated that, as organic cultivation required more knowledge, the lack of special knowledge about organic production methods sometimes led to problems.

The major difficulties named by farmers regarding plant production were weeds (Austria²⁷, Norway³⁷ and Switzerland⁴³), phytosanitary problems (Estonia³⁴) as well as sufficient nutrient supply for the cultivated plants (Norway⁵⁰). These problems resulted in low yields (Norway¹⁰) or poor quality due to which the products were not marketable. Nevertheless, the agricultural consultants in Denmark mentioned that weeds were not as problematic as the farmers anticipated before the conversion to organic farming. Interestingly, Kaltoft and Risgaard^{8,32} reported in their qualitative study that Danish farmers did not intend using pesticides after resuming conventional farming. Nevertheless, some farmers outsourced spraying to avoid doing it themselves.

In animal husbandry, the major difficulties were access to sufficient amounts of organic litter and fodder (e.g., Switzerland⁴³). In Norway, obtaining enough straw for litter was a problem because many organic farms are not located in regions where most of the grain is cultivated. These farms often had difficulties in obtaining enough organic feed grain as well. The necessity to feed 100% organic fodder and the obligation to build free stall barns led to reversions especially for organic dairy farms, because they did not receive premium prices for their milk³⁷.

Macro environment. In several studies it was found that the macro environment of the farm poses difficulties, especially regarding production and marketing of organic products. Large organic processors in Denmark (e.g., mills) were too far away from the producers and did not accept small quantities, which resulted in farmers selling their produce to smaller, local conventional mills^{8,32}. Rigby *et al.*⁴⁶ mentioned the same problem in the United Kingdom, where long distances to wholesalers and processors, like abattoirs or packers, proved to be a problem. Schmid³¹ found that good regional infrastructure for marketing organic products resulted in more

organic farms in Austria, whereas in regions with poor infrastructure there were large numbers of reversions. Some farmers in the United Kingdom who reverted mentioned a general lack of demand for their organic products⁴⁷. In Norway, especially vegetables were difficult to market locally at a premium³⁷.

In Denmark, the scarcity of agricultural land sometimes resulted in reversion. When farmers wanted to grow and intended to increase their herd size, they needed access to more land. In cases where it was not possible to expand, the decision was between staying organic without increasing herd size or growing and reverting to conventional production, because the existing acreage was not sufficient to fulfill the organic regulations or to produce enough organic fodder⁸.

Conclusions

Although several studies with the focus on organic farmers reverting to conventional agriculture already exist, there is still a lack of knowledge regarding this phenomenon. As it appears, there is neither a uniform pattern of steady increase or decrease in the number of organic farms per country, nor certain years in which large-scale deregistration occurred in several countries simultaneously. It would be of great interest to divulge the reasons behind different phenomena in the respective countries or via a cross-country research project.

Obviously, the farmers' reasons for reversion depend on the specific situation in each country. Nevertheless, there are many similarities and common reasons for reverting to conventional agriculture. In general, the literature review gives the impression of unmet expectations in several fields. Apparently, the farmers' expectations regarding economic performance, implications of the certification and control system as well as the adoption of organic management techniques may differ considerably from reality. More research is needed to explore whether better preparation and more information on various aspects of organic farming and marketing before conversion could contribute to lower reversion rates and the form in which this information should be communicated.

Although the final causes for reversion are manifold and most farmers stated a combination of reasons for reversion, the literature review shows that economic problems are the crucial factor in most cases. If frustration with the economic performance of organic management is the main reason for reversion, it seems likely that for these farmers economic motives played a major role in the decision to convert to organic farming as well. It remains to be investigated whether the farmers who claim to have converted mainly out of other, non-economic motivations (see Table 3), are more likely to continue organic farming despite economic difficulties.

Likewise, an analysis of the utility of converting to organic farming and reverting to conventional farming in

relation to economic aspects would give further insights into the decision-making process. Hence, it could be determined whether the decision to revert is mainly due to unmet economic expectations or appears to be an economic necessity in order to maintain the farming business. To this effect, an objective evaluation of the economic situation of organic and reverted farms and their actual market environment (regarding marketing, processing, prices, subsidies, etc.) presents a possibility for further research^{51–55}.

Another frequently mentioned difficulty apparently was the problematic and interfering bureaucracy which farmers encounter with organic certification⁵⁶. Considering that many reverted farmers plan to continue using organic farming methods without certification, which subsequently results in not being able to market their products as organic products and therefore not receiving premium prices or organic subsidies¹⁰, the burden farmers associate with documentation and control should not be underestimated. Legislation bodies and certification organizations should contemplate measures regarding bureaucratic redtape which may help reduce or at least simplify the procedures involved.

The theoretical model suggests that an evaluation of the possible future utility of organic and conventional management also contributes to the decision to revert. In this context, the role of private or official advisory services becomes apparent. It needs to be further investigated to what extent professional consultation and guidance could influence and improve the future prospects of organic management. As already mentioned by Reissig et al.⁴², control on organic farms could not only be used to critically supervise farming practices but also establish better contact and offer support and suggestions for improvement.

The institutions concerned with organic legislations should also ensure stable and predictable regulations for the future⁴⁵. The uncertainty that farmers associate with organic regulations leads to a higher risk perception regarding future organic management compared with the conventional alternative. Any changes should therefore be announced in advance to enable the farmers to implement the changes, especially in cases when considerable investments are required (e.g., regarding animal husbandry).

Access to land is another important key issue, which will have an increasing impact on the relative utility of organic management in the future. In the past few years, high prices of land tenure (as a result of high prices for energy crops) were an impediment for organic farmers to develop their farms in Germany⁵⁷ as well as in other countries as well⁸. The energy farmers are capable of paying much higher prices and might easily outplay the organic farmers when it comes to land tenure. If an investment into the production of renewable energies is economically much more promising than organic production, farmers might be tempted to revert to

conventional agriculture and to turn to production of energy crops instead. As long as there is heavy governmental support for renewable energy sources, resulting in a much higher expected utility of conventional farming compared with organic farming, this might be counter-productive for the expansion of organic agriculture.

Considering the attempts of many governments to support the expansion of organic farming area by offering attractive subsidies for conversion, and considering the large dropout rates in many countries, it seems promising to take measures to prevent organic farmers from reverting rather than merely trying to recruit new ones¹⁰. More knowledge is necessary to ascertain why farmers' expectations are not fulfilled, especially with regard to the loss of transaction costs for first converting to organic and later reverting to conventional agriculture. More research is also needed regarding the consequences of possible negative impact of the word of mouth communication of reverted farmers on the image of organic farming and the effects of reverting farmers on other organic farmers. Besides, discontented organic farmers might prevent conventional farmers from converting to organic farming techniques.

Apparently, the farmers' decision to convert to organic farming is not necessarily a 'fundamental' one-way decision^{16,58}, but a decision that might be put into question after some years. A comparison between organic farmers deciding to remain organic and farmers choosing to revert with respect to the farms' economic, infrastructural and other relevant circumstances, would give further indications of the critical success factors. A deeper understanding of the influencing factors and changes that are necessary for farmers to remain organic should be an important objective for on-going research. The information could be gained by qualitative research methods such as focus group discussions and expert interviews with representatives of farmers' organizations and advisory services.

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